

Notice of Allowability

Application No.

09/714,426

Applicant(s)

MCDERMOTT ET AL.

Examiner

Art Unit

Brian D. Nguyen

2661

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed 3/29/05.
2. ☒ The allowed claim(s) is/are 6, 7, 11-13, and 24 (renumbered 1-6, respectively).
3. ☒ The drawings filed on 16 November 2000 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 3/29/05
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 08082005
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____



8/9/05

BRIAN NGUYEN**PRIMARY EXAMINER**

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.
2. Authorization for this examiner's amendment was given in a telephone interview with Thomas Kelton on 8/8/05.
3. The application has been amended as follows:

AMENDMENT TO THE SPECIFICATION

Please amend the paragraph on page 1 as follows:

This application is related to co-pending and commonly assigned U.S. Application Serial Number 09/703,057 [~~59182-P001175-10020638~~], entitled "system And Method For IP Router With an Optical Core," to co-pending and commonly assigned U.S. Application Serial Number 09/703,056 [~~59182-P002175-10020639~~], entitled "System and Method for Router Central Arbitration," to co-pending and commonly assigned U.S. Application Serial Number 09/703,038 [~~59182-P004US-10020641~~], entitled "System and Method for Router Data Aggregation and Delivery," to co-pending and commonly assigned U.S. Application Serial Number 09/702,958 [~~59182-P006US-10020643~~], entitled "Timing and Synchronization for an IP Router Using an Optical Switch," now issued as United States Patent 6,711,357 to co-pending and commonly assigned U.S. Application Serial Number 09/703,027 [~~59182-P012US-10021641~~], entitled "Router Network Protection Using Multiple Facility Interfaces," to co-pending and commonly assigned U.S. Application Serial Number 09/703,043 [~~59182-P013US-10021642~~], entitled "Router Line Card Protection Using One-for-N Redundancy" now issued as United States Patent 6,879,559, and to co-pending and commonly assigned U.S. Application Serial Number 09/703,064 [~~59182-P014US-10021643~~], entitled "Router Switch Fabric Protection Using Forward Error Correction," now issued as United States Patent

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6,894,970, all filed October 31, 2000, the disclosures of which are incorporated herein by reference.

Please amend the paragraph beginning at page 4, line 24, as follows:

Various aspects of the invention are described in co-pending and commonly assigned U.S. Application Serial Number 09/703,057 [~~59182-P001US-10020638~~], entitled "System And Method For IP Router With an Optical Core," co-pending and commonly assigned U.S. Application Serial Number 09/703,056 [~~59182-P002175-10020639~~], entitled "System and Method for Router Central Arbitration," co-pending and commonly assigned U.S. Application Serial Number 09/703,038 [~~59182-P004US-10020641~~], entitled "System and Method for Router Data Aggregation and Delivery." co-pending and commonly assigned U.S. Application Serial Number 09/702,958 [~~59182-P006US-10020643~~], entitled "Timing and Synchronization for an IP Router Using an Optical Switch," now issued as United States Patent 6,711,357, co-pending and commonly assigned U.S. Application Serial Number 09/703,027 [~~59182-P012US-10021641~~], entitled "Router Network Protection Using Multiple Facility Interfaces," co-pending and commonly assigned U.S. Application Serial Number 09/703,043 [~~59182-P013US-10021642~~], entitled "Router Line Card Protection Using One-for-N Redundancy" now issued as United States Patent 6,879,559, and co-pending and commonly assigned U.S. Application Serial Number 09/703,064 [~~59182-P014US-10021643~~], entitled "Router Switch Fabric Protection Using Forward Error Correction," now issued as United States Patent 6,894,970, all filed October 31, 2000, the disclosures of which are incorporated herein by reference.

Please amend the paragraph beginning at page 8, line 10, as follows:

A system and method for a network router with an optical switching fabric is described in U.S. Application Serial Number 09/703,057 [~~59182-P001US-10020638~~], cited above. Although for the purpose of clarity corresponding input and output functions are shown on separate circuit cards in separate 1/2 line shelves, embodiments are described in which corresponding input and output functions are combined on a single circuit card in a single line shelf combining 1/2 input and output line shelves, thus creating a folded router system configuration. Particularly, input and output packet forwarding line cards can be combined into a single physical circuit card in a single line shelf. In this folded system configuration, dedicated output multicast card 16 and

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dedicated input multicast card 18 are in fact the same circuit card, and data loop 108 can become simply a conductive trace on that single circuit card.

Please amend the paragraph beginning at page 8, line 27, as follows:

Alliteratively, replica multicast packets can be forwarded simultaneously within one switch cycle to multiple destinations, provided that optical switch fabric 12 incorporates m multiple switching subplanes, for example subplanes 12-1 through 12-3, that support m multiple parallel switching paths, illustrated schematically by switching paths 112-1 through 112-3. In the router system described in U.S. Application Serial Number 09/703,057 [~~59182-P001US-10020638~~], cited above, for example, a multiple subplane switch fabric architecture supports simultaneous parallel switching paths. This structure allows sending two or more multicast replica packets in parallel simultaneously from one dedicated input multicast card 18 through switch fabric 12 to multiple destination output line cards 20-1 through 20-N along separate paths, for example a path through link 110-1 and then through switching path 112-1 and a separate path through link 110-3 and then through switching path 112-3. If the required multicast output size were six, for example, one multicast packet could be sent from input line card 14 to a dedicated multicast card 16, 18, which could replicate the packet and transmit up to three multicast replicas in parallel to three destination output line cards, for example output line cards 20-1 through 20-3, during one switch cycle, and then during a subsequent switch cycle transmit another three multicast replicas in parallel to three additional destination output line cards, for example output line cards 20-4 through 20-6. This multicast operation requires three switch cycles, namely one cycle to send the original multicast packet from the input line card to the dedicated multicast card, and two additional cycles to transmit multicast replicas to the six destinations at three replicas per cycle. Because the first cycle is pipelined, the actual delay is two cycles.

AMENDMENT TO THE CLAIMS

Claims 1-5, 8-10, 14-23 are cancelled.

Please replace claims 6, 7, 11-13, and 24 with the following claims:

Claim 6 (Currently Amended) A method of multicasting a data packet from a single input to multiple outputs of a router system having a switching fabric, comprising:

transferring the data packet to be multicast (multicast packet) from a router input to a dedicated multicast output card;

transferring said multicast packet from said dedicated multicast output card to a dedicated multicast input card;

storing said multicast packet on said dedicated multicast input card; and

transferring said stored multicast packet from said dedicated multicast input card to said multiple outputs of said router system, wherein said multicast packet is replicated to produce a replica packet, wherein said switching fabric contains multiple inputs and said multiple outputs connected through multiple parallel switching paths, wherein multiple replica packets are transferred in parallel to said multiple outputs during a single cycle of said switching fabric, and

wherein said multicast packet is sent through said switching fabric $1 + \text{CEILING}\left(\frac{N}{m}\right)$ times

wherein N is the quantity of said multiple outputs, wherein m is the quantity of said multiple parallel switching paths, and wherein the CEILING function rounds the value of a variable up to the next higher integer.

Claim 7 (Currently Amended) The method of claim 6, wherein said dedicated multicast output card and said dedicated multicast input card are combined into a single dedicated multicast card.

Claim 11 (Currently Amended) The method of claim 6 wherein said replica packet is produced at a location selected from the group consisting of said dedicated multicast output card and said dedicated multicast input card.

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Claim 12 (Original) The method of claim 6 wherein said multicast packet is converted from an electrical packet to an optical packet at said dedicated multicast input card.

Claim 13 (Currently Amended) The method of claim 6 wherein said multicast packet is transferred from said dedicated multicast input card to said multiple outputs through said switching fabric.

Claim 24 (Currently Amended) A method of multicasting a data packet from a single input to multiple outputs of a router system having a switching fabric, comprising:

transferring the data packet to be multicast (multicast packet) from a router input to a dedicated multicast output card;

transferring said multicast packet from said dedicated multicast output card to a dedicated multicast input card;

storing said multicast packet on said dedicated multicast input card; and

transferring said stored multicast packet from said dedicated multicast input card to said multiple outputs of said router system, wherein said multicast packet is transferred to said dedicated multicast output card through said switching fabric, wherein said multicast packet is transferred substantially simultaneously to a plurality of dedicated multicast output cards through said switching fabric, wherein said multicast packet is transferred from a plurality of dedicated multicast input cards to said multiple outputs through said switching fabric, wherein said switching fabric contains multiple inputs and said multiple outputs connected through multiple parallel switching paths, wherein said multicast packet is replicated to produce a replica packet, wherein multiple replica packets are transferred substantially simultaneously in parallel from said plurality of dedicated multicast input cards to said multiple outputs during a single switching

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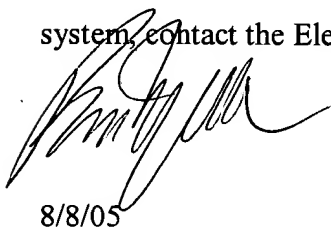
cycle of said switching fabric, and wherein said multicast packet is sent through said switching fabric $\text{CEILING}\left(\frac{N}{m}\right) + \text{CEILING}\left(\frac{N}{mM}\right)$ times, wherein N is the quantity of said multiple outputs, wherein M is the quantity of said plurality of dedicated multicast cards, wherein m is the quantity of said multiple parallel switching paths, and wherein the CEILING function rounds the value of a variable up to the next higher integer.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian D. Nguyen whose telephone number is (571) 272-3084. The examiner can normally be reached on 7:30-6:00 Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chau Nguyen can be reached on (571) 272-3126. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



8/8/05

BRIAN NGUYEN
PRIMARY EXAMINER